

How Does Amino Acid Therapy Compare to Prescription Medications in the Treatment of Mental Disorders

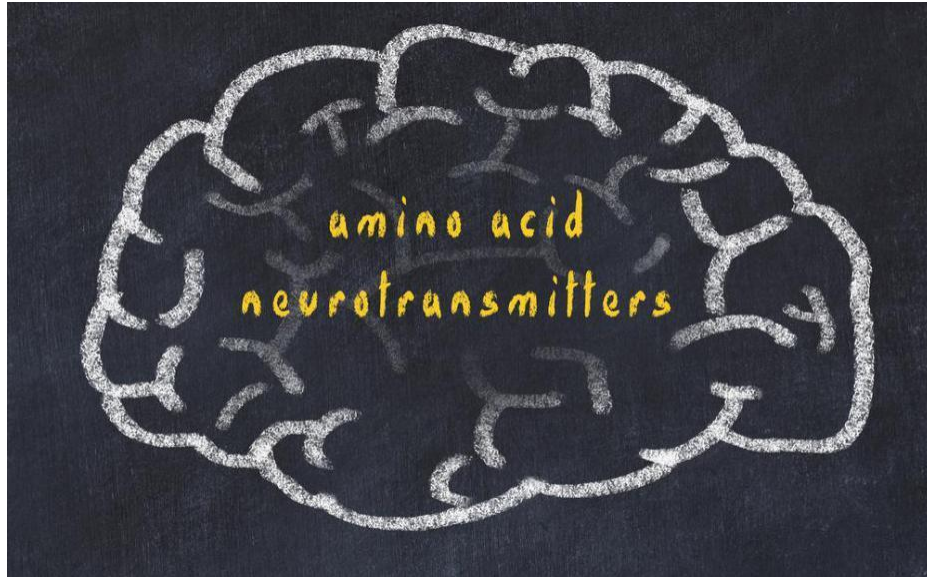
By Rev Meg Montañez



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How Does Amino Acid Therapy Compare to Prescription Medications in the Treatment of Mental Disorders?



“ For every drug that benefits a patient, there is a natural substance that can produce the same effect.” - Carl C. Pfeiffer, MD, PhD

Over 10% of the global population is affected by mental health disorders. Major anxiety, depression, bipolar disorder, schizophrenia, alcohol/substance use disorders, and dysthymia (persistent mild depression) were identified as leading causes of disability in the U.S. Less than 1/3 Americans on antidepressants have had an appointment with a mental health professional within the last year. Psychiatric medications are being prescribed by primary health care providers who typically lack extensive psychiatric training. Modern mental healthcare plans are often void of holistic mental health care plans and frequent monitoring of patients is not happening. This is alarming when considering the steady influx of medications being prescribed and utilized. Total prescriptions filled in 2020 increased by 21% and anti-anxiety prescriptions rose 34%

Common Mental Health Conditions

Anxiety:

Anxiety disorders affect 40 million adults worldwide and 18.1% of the US population making it the most common mental illness. (Anxiety and Depression Association of America). These disorders are characterized by persistent worry, fear that interferes with one's everyday life.

Anxiety Subtypes

- Panic Disorder: feelings of terror that suddenly appear; chest pain, sweating, palpitations
- Social Anxiety Disorder: worry over everyday life
- Specific Phobias: intense fear of specific situation or object
- Generalized Anxiety Disorder: excessive unrealistic worry

Holistic Solutions

- 5 HTP or L-tryptophan
- Inositol: up to 4,000 mg daily
- N-acetylcysteine (NAC): up to 3,000 mg daily
- Saffron
- Food intolerance testing
- Histamine/ammonia screening (include snps)
- Pyroluria screening
- Heavy metal screening
- Blood sugar regulation

Depression:

Depression affects 264 million people worldwide. Persistent low mood, fatigue, and profound sadness are prominent symptoms of major depression.

Depression Types

1. Low catecholamine (sluggish, lack of energy)
2. Low serotonin (negative thinking, suicidal)

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Depression Biotypes

- Undermethylation (38%): reduced serotonin, dopamine, SSRI responsive
- Folate deficiency (20%): elevated serotonin, dopamine
- Copper overload (17%): elevated norepinephrine
- Pyrrole disorder (15%): reduced serotonin, GABA
- Toxicity (5%)
- Other (5%): food allergies, casein and gluten intolerance, very low thyroid, very low blood sugar, medication side effects, recreational drug use

Holistic Solutions

- Food intolerance testing
- Histamine/methylation screening
- Pyroluria screening
- Heavy metal screening
- 5 HTP or L-Tryptophan

Bipolar Disorder

Bipolar disorder consists of radical shifts in depressive (low moods) and manic (high) moods that can last weeks long. Bipolar disorder affects 46 million people in the world. Symptoms of mania include long periods of feeling high or overly happy and extreme irritability. Fast talking, jumping from idea to idea, racing thoughts, easily distracted, increasing activities, overly restless, little sleep but not tired, unrealistic beliefs in abilities, impulsive behavior, and domestic violence are symptoms of bipolar disorder.

Bipolar subtypes

1. Bipolar I: one or more episodes of mania; must last 7 days & requires hospitalization
2. Bipolar 2: depressive episodes shifting back and forth with hypomanic but never manic episodes
3. Cyclothymic Disorder (Cyclothymia): chronic unstable mood state with hypomania and mild depression for at least 2 years; brief periods of normal mood usually last less than 8 weeks
4. Bipolar Disorder Other Specified and Unspecified: significant mood elevation that does not meet criteria for bipolar I, II, or cyclothymia
5. Mixed Features: occurrence of simultaneous symptoms of opposite mood polarities during manic, hypomanic, or depressive episodes. High energy, insomnia, racing thoughts, hopelessness, irritability, suicidal

Rapid-cycling: four or more mood episodes within 12 months

Holistic Solutions

- Food intolerance testing
- Histamine/methylation screening
- Pyroluria screening
- Heavy metal screening
- Omega 3s, GLA, niacin, vitamin C
- Theanine, GABA

Schizophrenia

Schizophrenia affects 20 million people. It is a psychotic disorder characterized by a loss of contact with reality. Symptoms include:

Positive Symptoms

- Delusions: false beliefs
- Hallucinations: feeling, tasting, hearing, smelling things not present
- Disorganized speech and behavior: moving from one topic to another quickly in a way that doesn't make sense; made-up words often used

Negative Symptoms

- Apathy
- Social withdrawal
- Lack of drive
- Emotionally unresponsive

Subtypes of Schizophrenia

- Paranoid
 - The person feels extremely suspicious, grandiose, persecuted (can be one or a combination of all)
- Disorganized
 - Incoherent speech and thought
- Catatonic
 - Withdrawn, mute, negative, assumes strange body positions
- Residual
 - No longer has hallucinations or delusions; no interest in life
- Schizoaffective

- Symptoms of schizophrenia and major mood disorder (like depression)

Schizophrenia/Psychosis Biotypes

- Overmethylation: 42%
- Undermethylation: 28%
- Pyrrole disorder: 20%
- Gluten intolerance: 4%
- Other: 6% (thyroid, low blood sugar, medications side effects, recreational drugs)

Holistic Solutions for Schizophrenia

- Food intolerance testing
- Histamine/methylation screening
- Pyroluria screening
- Heavy metal screening
- Omega 3s, GLA, niacin, vitamin C
- Theanine, GABA
- AVOID DOPAMINE

Substance use Disorders

The frequent use of alcohol and/or drugs that interferes with a person's behavior in day-to-day life. Worldwide, alcohol use disorder affects 107 million and drug use disorder affects 71 million people.

Holistic Solutions

- Food intolerance testing
- Histamine/methylation screening
- Pyroluria screening
- Heavy metal screening
- Omega 3s, protein, vitamin C
- Address trauma
- Address ADHD
- Address bipolar, anxiety, depression, etc.

Treatment for mental illnesses are expensive. The U.S. spent \$187.8 billion on mental health conditions and substance use disorders in 2013. *\$70 billion of that cost was spent on depression treatment alone.* The total cost of treatment of anxiety and depression disorders across 36 countries worldwide is estimated to be \$147 billion by 2030, according to a study published by Lancet Psychiatry. This cost will produce a net

benefit (based on an estimated 5% improvement in work productivity) of a \$399 billion economic gain.

Average Cost to Deliver Treatment to Those with Medicare

- Schizophrenia treatment: \$8,509 for 11.1 days
- Bipolar Disorder treatment: \$7,593 for 9.4 days
- Depression treatment: \$6,990 or 8.4 days

Average Cost to Deliver Treatment for Those Who are Uninsured

- Schizophrenia treatment: \$5,707 for 7.4 days
- Bipolar Disorder treatment: \$4,356 for 5.5 days
- Depression treatment: \$3,616 for 4.4 days

The National Survey on Drug Use and Health defines mental health services as receiving inpatient or outpatient treatment or counseling or taking prescription drugs for mental health problems.

- 15% of American young adults (aged 18 to 25) received mental health care in one year. (SAMHSA, 2018)
- A quarter of college students have mental health disorders such as anxiety, depression, and alcohol use disorder. (*Psychological Services, 2020*)
- The majority (93%) of students are aware of on-campus services related to mental health. (American Psychological Association, 2018)
- Only 13% of students with a mental health problem utilize on-campus resources, such as counseling. (American Psychological Association, 2018)
- Less than a third of white adolescents do not receive mental health services, but half of minority adolescents do not receive needed care. (The National Alliance to Advance Mental Health, 2007)
- More than half of young people who have been involved with the juvenile justice system meet the criteria for at least one psychiatric disorder, yet only 15% of them have received treatment. (Office of Juvenile Justice and Delinquency Prevention, 2017)

Americans consume the most psychiatric drugs in the world. One in six Americans take psychiatric drugs for conditions like anxiety, depression, bipolar disorder, schizophrenia, panic attack, hallucinations, delusions, and more. These medications often worsen the very symptoms they are prescribed to treat. Medications such as Lexapro®, prescribed for depression, heed suicidal thinking and behavior warnings in the *prescribing*

information data. This fact gives rise to the large correlation between psychiatric drug use and suicide. Males make up 49% of the population but nearly 80% of suicides.

2018 suicide was the 10th leading cause of death for all Americas.

- The 2nd leading cause of death for age 1 to 34
- The 4th leading cause of death for ages 35 to 54

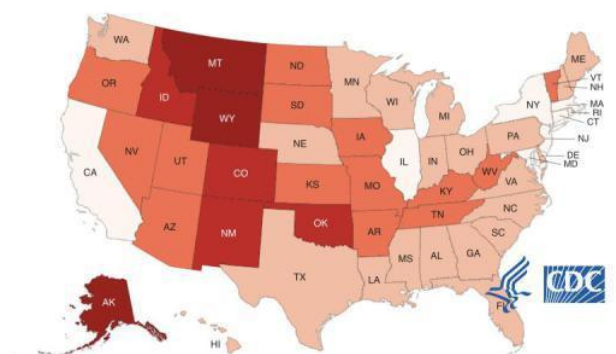
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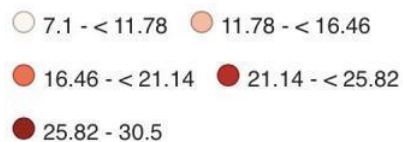
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National Center for Health Statistics

Suicide Mortality by State



Age-Adjusted Death Rates¹



Filters

Year

2020

Mental illness comprises two categories—those with *any mental illness (AMI)* and those with *serious mental illness (SMI)*, though these are not mutually exclusive. In 2018, more than a quarter (26.3%) of adults aged 18 to 25 years old had any mental illness and nearly 8% of adults aged 18 to 25 had a serious mental illness. The rate of individuals in the same age group reported symptoms consistent with major depression increased 63% from 2009 to 2017.

Any mental illness (AMI) is defined by the Substance Abuse and Mental Health Services Association (SAMHSA) as having any mental, emotional, or behavioral health disorder that met the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) criteria.

A person with AMI is defined as having a SMI by SAMHSA if their disorder substantially interferes with or limits one or more major life activities

Neurotransmitters

The brain is the master control panel for the entire body. It controls how we receive, interpret, and react or respond to information from the world around us as well as our internal state. Feelings, moods, behaviors, sleep, cognition, energy, and more are mediated through the neurotransmitters. When neurotransmitters are depleted, a wide array of mental dysfunctions such as anxiety, irritability, depression, insomnia, and other unwanted conditions arise. Replenishing neurotransmitters requires specific nutrients, amino acids, and cofactors in therapeutic range.

Neurotransmitters are endogenous chemical messengers that transmit signals between each other; they are responsible for everything we do. Amino acids can turn into neurotransmitters in 1 to 20 minutes making them the fastest capability of anti-depression and anxiety abilities. Unlike prescription medications, amino acids can be used as needed. BH4, vitamins, and minerals can assist in the conversion of neurotransmitter synthesis if amino acids are not favorably working. Stress increases the need for neurotransmitter function. Inadequate neurotransmitter levels result in improper communication between the cells. When neurotransmitter storage becomes depleted there are not enough neurotransmitters in the synapses to carry the messages resulting in poor communication between the neurons.

During normal brain functioning, signals in neurotransmitters are received from the dendrites before being transmitted down the fatty-acid axon where they are stored in the synaptic vesicles at the terminal. When the cell is functioning well, the membrane will open and release the neurotransmitters into the synapse (the area between cells) where

they attach to receptors on postsynaptic neurons where the signal continues down the axon. Neurotransmitters that are not picked up by the postsynaptic receptor sites are either degraded by enzymes or recycled by reuptake pumps where they are restored in the vesicles.

Genetic abnormalities can create depleted neurotransmitters from birth. These defects can lower the amount of receptor sites or lower the amount of neurotransmitters produced. Stress, improper diet, illness, and other variables can contribute to neurotransmitter depletion and create emotional pain and a desire to seek relief.

Sufficient vitamin and mineral cofactors are required for the conversion of neurotransmitters

The four major mood mediating transmitter systems, precursors and supporting amino acids:

- Dopamine/Norepinephrine L-tyrosine, L-phenylalanine
- Endorphins/Enkephalins L-tyrosine, L-phenylalanine, GABA, tryptophan
- GABA 5 HTP, and others
GABA, taurine, glycine, theanine
- Serotonin/Melatonin L-tryptophan, 5 HTP

Essential amino acids, found in foods, clump together to form protein. Digestion of protein converts the molecules back into amino acids. Adequate digestion and absorption of protein, vitamins and minerals are essential for re-building neurotransmitter systems. ***Damaged digestion and absorption inhibits neurotransmitter rebuilding.*** Amino acids do not need to be digested and are absorbed upon ingestion. Ingested amino acids cross the blood brain barrier in the presence of vitamins, minerals, and co-factors to create new neurotransmitters in 1 to 20 minutes depending on delivery method.

While animal products such as meat, fish, eggs, and milk contain high levels of amino acids, these food selections also come with disease (cancers), antibiotics, vaccines, feces, parasites, and other disease-promoting components. Clean sources of amino acids can be found in organic nuts, seeds (hemp, chia), and legumes.

Amino acids are generally taken on an empty stomach to aid in absorption by reducing competition with other amino acids. They can be taken as needed due to their quick

action. Vitamins, mineral cofactors, and fatty acids should be taken with food for proper transmission of neurotransmitters.

Medicines do not replenish neurotransmitters

Neurotransmitters are stored vesicles within the nerve. Membrane stability is necessary for proper neurotransmission to occur. For the electron transport chain to run the 5th complex chain (ATP synthase), intermembrane space in the mitochondria requires adequate amounts of protons. *Leaky cell membranes attribute to proton loss and mitochondria dysfunction.* Chronic stress inhibits homeostasis and cells that are unable to reboot cause inflammation and neurotransmitter dysfunction expressing itself as mood disorders.

Catecholamines

Alertness, enjoyment, energy, drive, motivation and optimal activity are all mediated by the catecholamine system and associated with confidence, ambition and the ability to solve problems.

Dopamine is one of the four major mood mediating neurotransmitter systems of the brain, responsible for reward, satisfaction, motivation, pleasure, stress management, and effective cognition and memory. It is made from tyrosine in the axon

and modulated by GABA, endorphins, and the endocannabinoids. Deficiencies in any of these systems will negatively impact dopamine firing which leads to Reward Deficiency Syndrome (difficulty dealing with stress and often exhibit emotional and behavioral issues). A genetic issue in any of the receptors involved in the conversion of neurotransmitters (GABA, serotonin, endorphins) can impact the firing of dopamine in the reward center of the brain (nucleus accumbens).

Hypodopaminergia (low dopamine) is associated with:

- Cognition impairment
- Reduced memory
- Reduced decision making
- Reduced energy
- Increased stress
- Increased cravings
- Increased sadness
- Lack of overall well being
- Poor relationships

Low catecholamine levels create apathy, depression, lack of energy, boredom, lack of focus and cravings for stimuli. Many individuals feel they need a stimulant in order to have enough energy to normally function.

Stimulants for Low Catecholamines (dopamine)

1. Medications: Ritalin, Adderall, Concerta, Wellbutrin
2. Coffee, tea, soda, energy drinks
3. Chocolate
4. Cocaine
5. Meth
6. Marijuana
7. Opiates

Catecholamine synthesis begins with the amino acid L-phenylalanine. This comes from food. Specific vitamins, minerals, and co-factors are required for conversions to occur. In the sequencing of synthesis, L-phenylalanine is converted into tyrosine, L-tyrosine converts into L-dopa, L-dopa converts into dopamine, dopamine converts into norepinephrine, and norepinephrine converts into epinephrine (adrenaline).

Dopamine, norepinephrine, and epinephrine are the neurotransmitters.

For tyrosine to convert into dopa, tetrahydrobiopterin (BH4), which requires sufficient methyl groups, is essential. Conversions of epinephrine and norepinephrine require adequate SAMe (primary methyl donor). Issues with MTHFR may inhibit sufficient SAMe, impairing the conversion synthesis. Producing neurotransmitters are not activated and require agents to attach themselves to turn them on. Methyl groups (CH₃) act as a key in the process of neurotransmitter activation.

MTHFR

MTHFR (methylenetetrahydrofolate reductase) is the rate-limiting enzyme in the methyl cycle and is a common genetic mutation. The primary function of MTHFR is to provide the body with instructions in creating the MTHFR protein. This helps the body produce folate which is necessary to create DNA. Problems with methylation can severely impact mental health. Gene mutations are inherited and may lead to high levels of homocysteine in the blood and low levels of folate and other vitamins. One copy of the MTHFR gene can be inherited from each parent. If both parents have mutations, the risk of having a homozygous mutation is higher. A person with two copies of the C677T mutation or one copy of each mutation may be at risk of high homocysteine levels which

may affect the body's function. Health conditions linked to MTHFR depend on the type and number of mutations.

Mental Health Issues Related to MTHFR

- Anxiety
- Depression
- Bipolar disorder
- Schizophrenia

The genetic MTHFR does not impact digestion, however, it impacts the production of neurotransmitters from the amino acids. There are two variant forms of mutations that can occur on the MTHFR gene; C677T and A1298C. It's possible to acquire both C677T and A1298C mutations, which is one copy of each. Genetic mutations in the 677, 1298 and insufficient SAMe (primary methyl donor) impact and slow down conversion of amino acids into neurotransmitters. The 1298 polymorphism impacts neurotransmitter production more significantly than the 677.

Reward Deficiency Syndrome was discovered by Dr. Kenneth Blum and Dr. Ernest Noble in 1990 when they found an association between a specific gene and addictive behaviors. This syndrome is characterized by genetically influenced D2 receptor site deficiencies. Deficiencies lead to low dopamine activity resulting in normal lack of enjoyment, and creating disorders like substance use, eating disorders, and others.

Nicotine, alcohol, and sugar fire all four neurotransmitter systems. Marijuana fires all four along with the endocannabinoid system. Ecstasy increases activity of serotonin, dopamine, and norepinephrine and blocks reuptake. Cocaine only fires dopamine, making sugar the more addictive substance of both ecstasy and cocaine. Sugar directly fires the receptors but it does not block reuptake. Blocking the reuptake receptors creates a buildup of the substances in the synapse causing receptors to flood and creating a high.

Restoring the catecholamine neurotransmitter systems requires *a thoroughly digested diet* that is high in quality protein containing the amino acids L-phenylalanine and tyrosine

Plant-Based Sources of L-Phenylalanine

- Tofu, Tempe
- Vegetables: sweet potatoes, squash
- Nuts: almonds, macadamia nuts, cashews, walnuts, pistachios
- Seeds: pumpkin seeds, squash seeds, hemp seeds, sunflower seeds

- Nut butters: peanut butter, almond butter, cashew butter
- Legumes: lentils, chickpeas, black beans, kidney beans, pinto beans

Plant-Based Sources of L-Tyrosine

- Soy beans, soy milk
- Barley, rice, pasta, oats
- *Vegetables*: spinach, watercress, turnip greens, chard, lettuce, seaweed, mustard greens
- *Fruits*: apple, pear, avocado
- *Seeds*: carob seeds, sesame seeds, pumpkin seeds
- *Nuts*: peanuts/peanut butter
- *Legumes*: bean

Amino Acid Therapy for Catecholamine Support

L-phenylalanine, DL-phenylalanine, or L-tyrosine

- L-phenylalanine and L-tyrosine can be taken in supplemental form
- Vitamins B3, vitamin B6, vitamin C, and iron are all needed as cofactors
- Typical adult starting dose for tyrosine is 500 mg
 - Effects typical within 20 minutes
 - Increase dose until symptoms are relieved
 - Doses can be given three times per day, divided
 - Avoid late dosing (can disturb sleep)

When amino acids fail to improve symptoms, certain genetic snps or a lack of cofactors can interfere with the conversion of LPA or tyrosine into dopamine or norepinephrine effectively. Increasing dopamine levels will not change symptoms if receptor sites are damaged by toxins.

Symptoms of low catecholamines are similar to low levels of fatty acids (omega 3) because omegas impact dopamine firing. Individuals scoring high on catecholamine screenings can take tyrosine in addition to omega 3 (3 to 6 g per day) for a synergistic effect. Tyrosine starts working within twenty minutes and the omega 3 within three days. Increased cognitive function, stress relief, and energy are the results of a well functioning catecholamine system.

Serotonin

Serotonin is a major neurotransmitter in the enteric system and has many functions in the body. 80% is produced in the gut and the rest is produced in the brain, however, gut serotonin stays in the gut and brain serotonin stays in the brain. It regulates mood

creating a positive outlook, emotional stability, self-confidence, and emotional flexibility. It also regulates pain, regulates appetite, and creates melatonin. Serotonin is sensitive to light, weather, and temperature. Low vitamin D and thyroid status can also affect serotonin levels. Deficiencies can create addictions for substances like alcohol, ecstasy, sugar, marijuana, and SSRIs.

Causes of Low Serotonin Include

- Lack of full spectrum light
- Chronic stress
- Chronic pain
- Chronic inflammation
- Under-methylation
- Aging
- Childhood trauma
- Excessive dopamine levels
- Low thyroid levels
- Low estrogen

Symptoms of Low Serotonin Include

- *Anxious, agitated depression*
- Irritability
- Tearfulness
- Social anxiety
- Low self-esteem
- Panic attacks, phobias
- Persistent worry
- Bulimia, compulsive overeating
- Obsessive thinking and behaviors
- Sugar/carbohydrate cravings
- Seasonal affective disorder
- Sleep issues
- PMS, Migraines, TM

Serotonin does not cross the blood brain barrier due to the enlarged molecules. 5-HTP and L-tryptophan do cross the BBB. Tryptophan (found in food) converts into 5-HTP, then into serotonin, and then melatonin with vitamin B6, vitamin C, magnesium, bioperin (BH4), and SAMe (methyl donor) cofactors. The metabolism of serotonin is degraded by oxidation, and the enzymes TDO (if tryptophan is too high) and IDO (over-produced by inflammation and aging). Serotonin metabolism is protected by niacinamide, L-lysine and cytokine-suppressing nutrients like curcumin.

Tryptophan competes with tyrosine and branched-chain amino acids like leucine and isoleucine for transport. It is better taken without other protein. Insulin clears the way for

tryptophan to cross the BBB, therefore it is acceptable to take tryptophan with carbohydrates. *If extensive inflammation is present*, tryptophan can go down an inflammation pathway and become toxic. In that case, *5 HTP might be a better option*.

When taken orally, 5 HTP can cause extreme nausea and vomiting. This happens due to the molecule combining with cofactors in the stomach, converting serotonin there before entering the bloodstream and crossing the BBB. 5 HTP can be taken with food or sublingual preparations can reduce this unwanted side effect. 5 HTP capsules containing B6 can expedite the conversion of serotonin in the stomach and should be avoided.

50 mg 5 HTP = 500 mg tryptophan

1000 mg - 3000 mg tryptophan for depression

Dosing Guidelines

5 HTP (daytime use)

- Can be taken at night
- Can be taken when symptoms appear
- 50 mg to 100 mg doses (higher doses are ok)
- 300 mg at bedtime can be used for insomnia

L-tryptophan (night use)

- Can be sedating
- 1000 mg to 3000 mg are typical doses for depression and insomnia

5 HTP + B5, B6, SAME = Melatonin

5 HTP: start 50 mg per week - move up to 200 mg as needed

Restoration Blocks

- Protein deficiency
- Caffeine, aspartame
- Excess tyrosine
- SSRIs, SNRIs
- Inadequate light (winter)
- Excessive or insufficient exercise
- Excess stress, excess pain
- Low vitamin B6; Pyroluria
- Low thyroid
- Low estradiol
- Low SAME
- Unresolved emotional trauma

- Inflammation

Risk of serotonin syndrome can occur if 5 HTP or tryptophan are combined with SSRIs, MAOIs, St. John's wort, HPB or migraine medications. Serotonin passes through breast milk. Individuals with liver cirrhosis or cancers should avoid supplementation.

Serotonin syndrome is a potentially life-threatening syndrome that is precipitated by the use of serotonergic drugs (SSRIs, SSNRIs, MAOI, 5 HTP, tryptophan) and overactivation of both the peripheral and central postsynaptic 5HT-1A and 5HT-2A receptors (most notably). Individuals who have taken serotonergic medications for extended periods of time typically have depleted serotonin receptors which explains the loss of efficacy in prescriptions. Taking low dose precursors (50 to 100 mg of 5 HTP or tryptophan) six hours away from the medication can help rebuild serotonin and increase efficacy of medications. If St. John's Wort is being used, precursors should be taken separately.

Serotonin Syndrome Symptoms

- Nausea and vomiting
- Headache
- Fatigue
- Euphoria
- Rapid heartbeat
- Dizziness
- Restlessness
- Fatigue
- Diarrhea

SSRI Adverse Effects

- Mania or bipolar
- Increased anxiety
- Increased depression
- Suicide
- Disturbed sleep
- Nausea
- Fatigue
- Risk of serious illness
- Emotional flatness
- Violence
- Weight gain
- Jitteriness
- Sexual dysfunction

The complete cessation of serotonergic medications can create serotonin syndrome. The symptoms of withdrawal occur within two to four days after drug cessation and usually last one to two weeks, however, it may persist up to one year. 50% to 86% of individuals will experience flu-like symptoms, gastrointestinal problems, disturbed sleep, fatigue, dizziness, depression, and anxiety. Tingling or electric shock sensations can be relieved by adding 6 g daily of omega 3. Medications should be slowly tapered down to prevent serotonin syndrome which can be fatal. Dissolving medication in water and discarding 10% of the solution can be an effective method for reduction.

Reduction of medications should not exceed 10% per week

SSRI detoxification requires a slow gradual approach to avoid withdrawal symptoms. Working with the prescribing physician can result in positive outcomes. A trial of 5 HTP or L-tryptophan can be used for two weeks to assess efficacy of dose and medicament. Trial doses often compliment the efficacy of SSRIs and should be taken six hours away from the SSRI dose. GABA can be used to tame excitatory neurotransmitters and assist with tingling or electric shock sensations, along with omega

GABA (γ -Aminobutyric acid)

GABA is the body's primary inhibitory neurotransmitter that allows us to slow down and to feel more relaxed. It is a primary natural anticonvulsant. GABA opposes glutamate (the primary excitatory neurotransmitter). Excessive glutamate can induce seizures and GABA can calm them. Signs of low GABA include epilepsy, convulsion, and tremor. Depleted GABA levels can occur with abrupt cessation of long-term alcohol use creating elevated blood pressures and accompanying seizures. GABA, taurine and magnesium or benzodiazepines can lower seizure risk.

Glutamine (found in food) turns into glutamate among other compounds like glutathione. Glutamate converts into GABA and then often back into glutamate. The GAD enzyme requires zinc and vitamin B6 to work. A depletion of these cofactors inhibits the conversion of GABA.

GABA production requires zinc and vitamin B6

Stressful events and trauma (past and present), insufficient sleep, malnutrition (lack of vitamin B6, zinc, magnesium), addictions (alcohol, benzodiazepines) or overactive conversion of glutamate can cause GABA depletion. Alcohol, marijuana, sugar, starch, tobacco, and benzodiazepines (Ativan, Xanax, Klonopin, Valium) fire GABA.

Ativan, Xanax, and Valium are commonly used benzodiazepines

Signs of Low GABA

- Stress
- Anxiety
- Overwhelm
- Tired muscle
- Restless sleep
- Fatigued but wired
- Irritable bowel syndrome

GABA is both an amino acid and neurotransmitter. Although amino acid molecules are typically too large to cross the blood brain barrier, supplementing with the amino acid GABA can increase GABA levels. A possible explanation for this occurrence is due to excess stress and cortisol levels that create leaky gut and blood brain barrier which allows GABA to enter the BBB. An unidentified transport system of GABA across the BBB could potentially be another cause.

GABA Support

- GABA
 - 100 mg - 500 mg daily, divided
- Vitamin B6: required for GABA synthesis
- Magnesium Glycinate (citrate can be used if constipation problem)
- Inositol: amplifies the GABA signal (can reduce OCD)
 - 500 mg to 4,000 mg
- Taurine: slows conversion of GABA to glutamate
 - 500 mg to 1,000 mg
- Theanine: partially blocks glutamate, epinephrine, norepinephrine, and cortisol; enhances dopamine and serotonin; works well for ADD, panic, and freeze
 - 100 mg to 200 mg

For susceptible individuals, increased anxiety or agitation can result from an increase of glutamate levels or activity when GABA is recycled back into glutamate too quickly. Doses over 500 mg should be used with caution. Poor response could be a result of low serotonin levels. High cortisol activity may require additional support (seriphos, holy basil, ashwagandha, reishi mushrooms, or L-theanine). Pyroluria should also be assessed and addressed as needed. GABA should be avoided with individuals who have very low blood pressure.

Endorphins

Endorphins create the feeling of happiness and joy and are activated when recalling good memories, eating enjoyable food, receiving a hug, thinking about a loved one, during sexual activity and other pleasurable things in life. Chronic stress, emotional and physical pain, poor diet (protein insufficiencies), hormone imbalance (low adrenal function or estrogen), genetics, brain injury, and lack of attachment in childhood can

result in low endorphins. Restoring endorphins requires high levels of good quality protein.

Symptoms of Low Endorphins

- Lack of pleasure
- Sensitive to pain
- Chronic physical pain
- Chronic emotional pain
- Loneliness
- Grief
- Tearful
- Borderline Personality Disorder

Endorphin Support

- *D-phenylalanine (DPA)*: (does not convert to tyrosine) slows degrading enzyme actions of carboxypeptidase A or endorphinase and enkephalinase (used during the day)
 - 500 mg to 1,000 mg three times a day
- *DL-phenylalanine (DLPA)*: (converts into tyrosine - do not take with melanoma) taken during the day (not night)
 - 1,000 mg to 2,000 mg and up, divided
- Foods: Cacao, spicy foods (capsaicin), rhodiola, ginseng, vanilla bean

Digestion, Absorption, and Mental Health

Sufficient nutrients are crucial to sustaining good mental health. Sources of nutrients should primarily come from food which need to be thoroughly digested to break down absorbable components and absorbed by the body. Proper elimination of toxic waste and indigestible substances is imperative to mental health by removing them from the colon and reducing internal inflammation. A void in these processes leads to malnutrition and toxicity, influencing mood and behavioral symptoms.

The sympathetic nervous system or parasympathetic nervous system status determines the efficacy of digestion. Sympathetic arousal increases levels of cortisol, norepinephrine, and adrenaline. These stress hormones impact the digestive process by inhibiting salivation, stomach activity, gallbladder impairment, and intestinal motility. Conversely, parasympathetic dominance stimulates saliva, digestive enzymes, stomach and gallbladder activity, peristalsis, and inhibits the release of glucose.

Digestion begins with smelling which stimulates the release of salivary amylase and begins the breakdown of foods into smaller molecules. Common problems associated with the mouth include improper chewing, chronic tooth or gum infections

that lead to chronic systemic infections, and amalgam fillings which contain mercury that degrade over time and releases mercury into the body creating psychiatric problems like depression and anxiety.

Once food has been swallowed, it travels down the esophagus and passes the epiglottis just above the larynx which prevents food and drink from entering the windpipe. A variety of reactions occur in the stomach. The primary function is to thoroughly grind food and mix it with enzymes to acidify it. This process promotes protein digestion and produces intrinsic factor, a glycoprotein which allows vitamin B12 to be absorbed.

The primary stomach enzymes are hydrochloric acid (HCL), pepsinogen, and pepsin. These enzymes moisten food, kill unwanted bacteria and fungi, and convert ferric iron into its ferrous form aiding in absorption. Sufficient acidity is necessary to absorb other minerals (calcium, magnesium, zinc, etc.) and requires sufficient salt (sodium chloride) for absorption. Stomach enzymes are reduced by stress and by toxins produced by candida and other pathogens. The stomach is coated with mucus which is protective and prevents acidity from entering the cellular lining creating ulcers. Stomach inflammation (gastritis, ulcers) and insufficient hydrochloric acid (can be a result of acid blockers) are primary problems of the stomach. Insufficient hydrochloric acid can lead to symptoms of heartburn and putrefied foods (leading to gas and bloating), allowing bacteria and fungi to travel down the digestive tract. Vitamins and minerals are not properly absorbed and chyme is not sufficient enough to promote sufficient release of pancreatic enzymes. Reducing stress and lowering chronic cortisol production, assessing and addressing pyroluria, ulcers and inflammation, and increasing HCL can improve the health of the stomach and digestion.

Increasing HCL

- Thoroughly chew food
- Vinegar (1 tablespoon in water after each meal)
- HCL capsules
- Herbs (simple bitters)

Address Ulcers

- Identify H. Pylori
- Mastic gum
- Antibiotics

Address Inflammation

- L-glutamine
- Aloe vera juice
- DGL
- Chamomile
- Meadowsweet

The chyme passes through the pyloric sphincter valve and enters the duodenum. Gall bladder bile, pancreas digestive enzymes, and bicarbonate are released and mix with the chyme. It moves into the small intestine (jejunum and ileum) where 95% of nutrient absorption occurs through the brush border on the villi which line the small intestine.

The junctions of the microvilli and villi should be very tight junctions which inhibit pathogens, foods, bacteria, and toxins from entering the bloodstream.

An increased permeability of the intestinal mucosal lining is called leaky gut; an inflammatory degenerative and/or atrophic mucosal damage. Gut dysbiosis (imbalance of bacteria in intestines) can impact mood and behavior due to the gut-brain axis.

Leaky gut is a hyperpermeable intestinal lining.

The digestive tract is plentiful in bacteria like bifidobacteria and lactobacteria which provide a protective barrier from toxins, parasites, and undigested food providing immune support. Intestinal flora provides 60-70% of energy and nutrients used by epithelial cells and are crucial for transporting nutrients throughout the gut wall and into the bloodstream. Causes of gut dysbiosis include antibiotics, antifungals, NSAIDs, steroids, contraceptives, high sugar/carbohydrate diets, infectious disease, chronic illness, surgery, radiation, chemotherapy, or having a mother with gut dysbiosis during birth.

There are 500 types of opportunistic flora species found in the gut, some of which can be the cause of IBS, Crohn's, and ulcerative colitis. Leaky gut can be caused by inflammation, candida albicans, spirochaetaceae and spirallacea families which produce toxins like histamine (histadelia) found in anxiety, depression, schizophrenia, addictions, and other mental disparities. Kryptopyrroles can be caused by dysbiosis leading to Kryptopyrroluria (a subtype of schizophrenia), and clostridia which is found in the stools of people with schizophrenia, psychosis, and severe depression. Small intestinal bacterial overgrowth (SIBO) is the presence of excess bacteria in the small intestine and is a cause of chronic diarrhea and malabsorption.

Inflammation

Inflammation is the process by which inflammatory chemicals are released into the bloodstream and tissues. Prostaglandins (PGE1) are made out of GLA and PGE3 is made from omega 3 fatty acids. Both are anti-inflammatory. PGE2 is made from arachidonic acid and is proinflammatory. Interleukin 6 (a primary inflammatory marker)

and cytokines are important to cell signaling. Chronic inflammation creates leaky gut, leaky blood brain barrier, toxicity, brain inflammation, and various psychiatric illnesses.

If inflammation is present, tryptophan will go down an inflammatory pathway and will not convert into 5 HTP. Part of it will turn into niacin and the other into carineuric acid, a neurotoxin. Starting with 5 HTP is suggested because tryptophan will not work and might worsen conditions. Organic acids test can demonstrate which metabolites tryptophan is converting into.

Tetrahydrobiopterin (BH4) is a chemical required in the conversion pathway for tryptophan to convert into serotonin, and tyrosine to turn into dopamine. A deficiency in BH4 results in inadequate conversions. Inflammation, toxicity, and hydroxyl free radicals (oxidative stress) lead BH4 to be stolen in order to reduce inflammation, support nitric oxide, and for the formation of glutathione. It can also be used to break down ammonia (CBS snp) which interfere with neurotransmitter conversions.

CBS (cystathionine beta synthase) catalyzes the first step of the transsulfuration pathway, from homocysteine to cystathionine. When the CBS snp becomes stressed, it can make one sensitive to high thiol sulfur which then turns into toxic ammonia due to the body's inability to properly methylate. It is common to see low levels of cystathionine and homocysteine since there is a rapid conversion to taurine. This leads to high levels of taurine and ammonia.

BH4 helps regulate neurotransmitters and mood

Other mutations, such as MTHFR A1298C, chronic bacterial infections, and aluminum can also lead to low BH4 levels. Careful regard with supplements is advised as many are high in thiol or are thiol inducing such as MSM, epsom salt baths, NAC, milk thistle and turmeric. Low thiol-sulfur diets are needed if one suffers from a mercury overload from dental amalgams.

CBS Symptoms

- Anxiety
- Depression
- Emotional disturbance/mood problems
- Impaired mental function
- Infections
- Thyroid insufficiency
- Adrenal insufficiency
- Gastritic
- Gallbladders stones
- Low zinc

- Pyrroles
- Low homocysteine
- High homocysteine

Microglial Cells

Microglial cells are the innate immune system of the brain. They are the first responders and blast anything that breaches the blood brain barrier. Once upregulated, there is no off switch and brain cells can degenerate from their destruction. Healthy microglial cells manufacture reproductive hormones from cholesterol and DHEA. Hormonal deficiencies lead to impaired neural transmission, myelination, synaptic activity, neuronal repair and migration.

Factors that upregulate microglial cells include emotional trauma and pain, physical trauma and pain, food intolerance and allergies, biotoxins, heavy metals, bacteria, virus, candida, diabetes, generalized inflammation, leaky gut and blood brain barrier, and loss of oxygen due to head trauma.

The blood brain barrier (BBB) is a network of blood vessels and tissue that is made up of closely spaced cells that helps keep harmful substances from reaching the brain. Only nanosized particles can get in or out of a healthy brain. When the gut becomes leaky, so does the blood brain barrier. Alcohol, high cortisol, elevated glucose, chronic toxic exposure, elevated homocysteine, poor antioxidant status, systemic inflammation, and stress can degrade the BBB. If leaky BBB, metal chelation is contraindicated.

Symptoms of upregulated microglial cells include brain fog, slow thinking, low brain endurance. A brain injury or impairment triggers an inflammatory response in the body can indicate brain immune dysregulation disorder.

Bioflavonoids and that calm inflammation

- Apigenin: basil, parsley, oregano, artichoke, celery, chamomile
- Luteolin: celery, parsley, broccoli, onion leaves, carrots, peppers, cabbages, apple skins, chrysanthemum flowers
- Baicalein: baikal skullcap, tea, chocolate
- Resveratrol: grape skin, red wine (organic), peanuts, cocoa, berries of *Vaccinium* species (blueberries, bilberries, cranberries)
- Rutin: buckwheat, apricots, cherries, grapes, grapefruit, plums, and oranges
- Catechins: tea leaves, apples, blueberries, gooseberries, grape seeds, kiwi, strawberries), green tea, red wine, beer, cacao liquor, chocolate, cocoa,
- Curcumin: liposomal
- ½ cup wild blueberries daily
- 1 tablespoon MCT oil daily

The liver is the most important detoxifying organ in the body. It regulates most chemical levels in the blood and excretes bile which carries waste products away from the liver. All blood leaving the stomach and intestines passes through the liver where it is processed, broken down, balanced, creates nutrients, regulates blood sugar regulation and amino acids, and metabolizes drugs among other processes. Toxin byproducts are excreted in the bile and blood after broken down. Bile-byproducts enter the intestine and leave the body in fecal matter. Blood byproducts are filtered by the kidneys and leave the body in urine. Liver toxicity causes a buildup of ammonia which can often be smelled in urine and sweat and affects anxiety, irritability, confusion, and brain fog

Conclusion:

Central Nervous System Disorders such as bipolar disorder, schizophrenia, major depression, anxiety, and addictions are driven by brain chemical imbalances. There are many causes, and conditions are multifaceted, leading to many solutions.

Causes that Influences CNS Disorders

- Genetics (Reward Deficiency Syndrome, pyroluria, detox pathways, methylation)
- Nutritional deficiencies
- Food intolerance
- Toxic reactions
- Hypoglycemia
- Gastrointestinal dysfunction
- Inflammation
- Immune system dysfunction

Neurotransmitters that affect mental health, such as serotonin and dopamine, are manufactured in the brain. The raw material for synthesizing neurotransmitters are vitamins, minerals, amino acids, and co-factors. A genetic or epigenetic imbalance in a nutrient can alter levels of key neurotransmitters resulting in abnormal brain chemistry. Each individual person is biochemically unique. Understanding individual biotypes allows for the correction of biochemical imbalances using nutrient therapies that can heal the brain.

Amino acid therapy dosing was created by Julia Ross and Dr. Charles Grant. The list of systems are correlated to brain stem and platelet levels of neurotransmitters. When amino acids fail to provide the desired effect, other factors are often present and need to be addressed. Phospholipids, cholesterol, and omega 3's are crucial for proper functioning and flexibility of the cell membrane for release and reuptake of neurotransmitters as well as proper transmission along the axon.

Amino acid dosing is not achieved by weight; it is achieved by trials and how the individual responds. Amino acids can also be used as part of a protocol in people with severe mental illness. 5 HTP has shown to lower manic episodes and seasonal affective disorder, and tyrosine can assist in the depression-side of bipolar disorder. Trialing doses should start low and build until desired effect is achieved. Lithium orotate can assist in mood stabilization. Gluten and casein should be removed in all cases of mental illness.

Amino Acid Precautions

- Previous negative reactions to supplements, foods, medications
- Serious physical illness (melanoma)
- Severe kidney or liver disease
- Ulcer or gastritis
- Pregnant or nursing
- Schizophrenia and other mental illness
- MAOI or other psychiatric medications
- L-phenylalanine and L-tyrosine can increase blood pressure and increase migraine headache. L-phenylalanine and L-tyrosine should not be used during manic episodes or in Graves disease
- GABA and taurine can lower blood pressure
- 5HTP can cause nausea. Avoid capsules with vitamin B6.

Neurotransmitter System Recap

SEROTONIN

- *Depression*
- L-tryptophan or 5 HTP

ENDORPHIN

- *Emotional pain*
- D-phenylalanine (DPA) or DL-phenylalanine (DLPA)

GABA

- *Stress*
- GABA and/or L-theanine

DOPAMINE

- *Depression* (catecholamine)
- L-tyrosine

Benefits and Risks of Nutrient Therapy

- Supplements are all natural
- Minimal side effects
- Complementary to traditional medicine
- Customizable to individual biochemistry
- Typically less expensive than pharmaceutical treatments
- Based on decades of research and treatment history
- 85% success rate (approximately 15% of failure rate is due to non-compliance)

The role of proper digestion and absorption is crucial to the long term balance of mental disorders. Pancreatic Enzyme Formula by Pure Encapsulations and Chewable Super Papaya Enzyme from American Health supports digestive function and absorption of nutrients.

Gut dysbiosis should be assessed and addressed as needed. A comprehensive stool analysis (Doctor's Data) can detect gut dysbiosis and can be ordered through DHA labs.

Anti-inflammatory products

- Omega 3
- Curcumin
- NAC
- Glutathione
- Zinc
- Vitamin A, Vitamin E, Vitamin D
- Selenium
- SO
- Catalase
- Peroxy nitrates

References:

- https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/021323s047lbl.pdf
- <https://nida.nih.gov/publications/research-reports/mdma-ecstasy-abuse/what-are-mdma>
- [s-effects-on-brain](https://nida.nih.gov/publications/research-reports/mdma-ecstasy-abuse/what-are-mdma-s-effects-on-brain)
- <https://nutritiondata.self.com/foods-011087000000000000000000-1.html>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4020178/>
- <https://www.sciencedirect.com/topics/medicine-and-dentistry/tryptophan-2-3-dioxygenase>
- <https://pubmed.ncbi.nlm.nih.gov/8153237/>
- <https://mthfrgenehealth.com/cbs-gene-mutation/>
- <https://drjockers.com/cbs-mutation-low-sulfur-diet/>
- <https://livingnetwork.co.za/chelationnetwork/food/high-sulfur-sulphur-food-list/>
- <https://www.juliarossures.com/>
- <https://www.juliarossures.com/craving-cure>